

205

# PROGRESS OF THEORETICAL PHYSICS

*Founded by H. Yukawa in 1946 Kyoto*

## Advisory Council

Kōdi HUSIMI      Minoru KOBAYASI      Masao KOTANI  
Ryogo KUBO      Takeo NAGAMIYA      Mituo TAKETANI

## Editorial Committee

Yasuhisa ABE      Tatuo KAWASAKI      Michiji KONUMA  
Ziro MAKI (Chairman)      Toshihide MASKAWA  
Yosuke NAGAOKA      Humitaka SATO      Shozo TAKENO  
Sho TANAKA      Masatoshi YAMAMURA

---

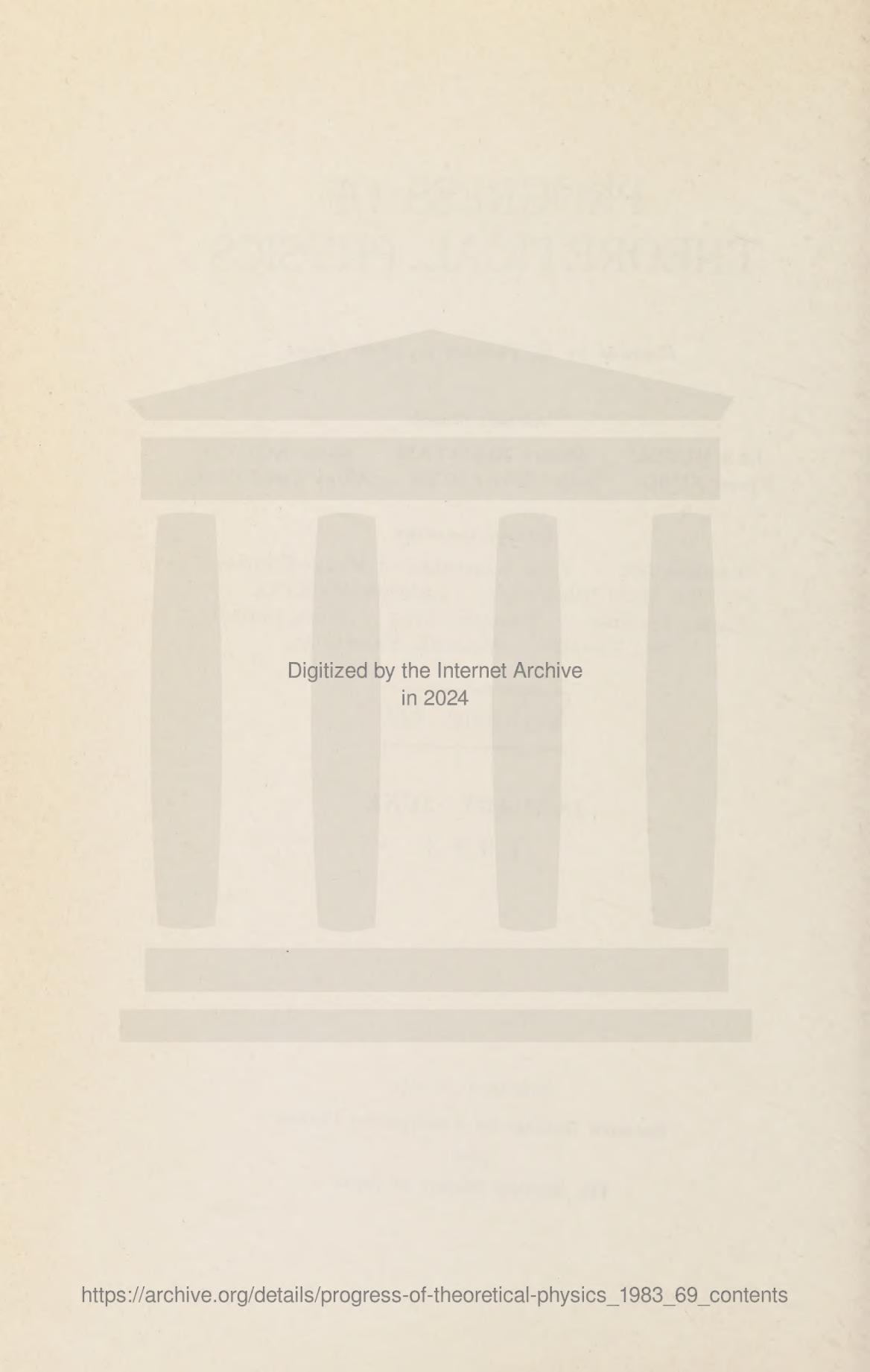
Volume 69

---

JANUARY—JUNE

1983

*Published for the*  
Research Institute for Fundamental Physics  
*and*  
The Physical Society of Japan

A faint, light gray watermark of a classical building with four columns and a triangular pediment is visible in the background.

Digitized by the Internet Archive  
in 2024

## No. 1 January

theory of Electronic Structures and Lattice Distortions in Polyacetylene and Itinerant Peierls Systems. II — <i>Coulomb Interaction Dependences of the HF Ground State, Lattice Dimerization and <math>^1B_u</math> Excited State in Regular Trans-Polyacetylene</i> —	Hideo Fukutome and Masaki Sasai	1
hidden Mattis Phase in Annealed System .....	Yasuhiro Kasai and Ayao Okiji	20
stability Theory of Synchronized Motion in Coupled-Oscillator Systems .....	Hirokazu Fujisaka and Tomoji Yamada	32
the Nonlinear Evolution Equations Related to the Wadati-Konno-Ichikawa Spectral Problem .....	M. Boiti, F. Pempinelli and G. Z. Tu	48
Phase Transition and Fractals .....	Masuo Suzuki	65
Far-Infrared Rotational Transition Lines of the Interstellar Water Vapor .....	Hiroshi Shibai and Toshinori Maihara	77
Void in the Closed Universe .....	Kei-ichi Maeda, Misao Sasaki and Humitaka Sato	89
A Jacobi Equation on the Coset Manifold $SO(2N)/U(N)$ and the Quasi-Particle RPA Equation .....	Seiya Nishiyama	100
Microscopic Study on Di-Nucleus States of $^{16}\text{O} + ^{40}\text{Ca}$ and $^{40}\text{Ca} + ^{40}\text{Ca}$ . I .....	Akihiro Tohsaki-Suzuki and Kiyomi Ikeda	113
Bare Potential DWBA for ( $d, p$ ) Reactions .....	Munetake Ichimura and Mitsuji Kawai	128
A Modified Glauber Approximation and the Formation of Shock Waves in High-Energy Heavy Ion Collisions .....	Masaharu Iwasaki and Shuji Takagi	142
Time Compound Nucleus for High Energy Nuclear Reactions .....	Ko Izumo and Hitoshi Araseki	158
Extended Folding Potential Model for $\Lambda$ -Deuteron System with Hard Core Potential .....	Kenji Hasegawa, Yasuo Yamamoto and Hiroharu Bandō	171
Relativistic Quarkonium Model Based on Instantaneous Ladder BS Equation. I — <i>Basic Equation and Its Properties</i> — .....	Toshiyuki Murota	181
Glueball Production in High Energy $e^+e^-$ Collision .....	Ei-ichiro Kawai	211
Unique Trajectory Method in Migdal Renormalization Group Approach and Crossover Phenomena .....	Masahiro Imachi, Sachiko Kawabe and Hiroshi Yoneyama	221
An Axial Gauge Formulation for QED <sub>2</sub> .....	Yuji Nakawaki	235
On the Relation of First-Class Constraints to Gauge Degrees of Freedom .....	Reiji Sugano and Toshieie Kimura	252
On the Structure of Space, Time and Field .....	Toshiaki Kaneko and Hirotaka Sugawara	262
The Electrodynamics with Magnetic Monopoles. I — <i>Coulomb-Gauge Kinematics</i> — .....	Kohji Hirata	300
Schouten Manifold with a Spinor Structure .....	Tsunehiro Obata and Hiroshi Oshima	314
Note on the Magnitude of Renormalization Constants in Quantum Electrodynamics .....	Seiya Aramaki	323
<b>Progress Letters :</b>		
On the Nonrelativistic S-Matrix .....	Ernst F. Hefter	329
Intermittency Associated with the Breakdown of the Chaos Symmetry .....	Hirokazu Fujisaka, Hiroshi Kamitukumoto and Masayoshi Inoue	333
Prediction of Pulsar Glitch Frequency Based on the Hard Superfluid Model .....	Naoki Itoh	338
Solutions of Einstein Field Equations with Zero-Mass Scalar Field and Conformal Scalar Field from Vacuum Solutions of Einstein Field Equations .....	V. B. Johri, G. K. Goswami and R. C. Srivastava	341
Level Density and Shell Structure — <i>Rosenzweig Model Revisited</i> — ..	Tatsuo Tsukamoto	344
Effect of the Neutron $^3P_2$ Pairing on the $\pi^0$ Condensation Threshold in Neutron Star Matter .....	Fumio Asai	348
Constituent Quark Parton Model and Soft Hadronic Processes .....	Akizo Kobayashi	351
Neutron Fraction in Primary Cosmic Rays Inferred from Muon Charge Ratio .....	Kisei Kinoshita and Akito Kuwazuru	354

Generations of Composite Fermions .....	Shinsaku Kitakado	358
One-Time Characteristic Functional in the Stochastic Quantization .....	Yoshimasa Nakano	361
Poincaré Algebra of QED with Dirac's Monopoles .....	Kohji Hirata	366
A Spinor Reconstruction Theorem .....	Yasushi Takahashi	369

## No. 2 February

Theory of Electronic Structures and Lattice Distortions in Polyacetylene and Itinerant Peierls Systems. III — <i>Coulomb Effects on Solitons and Effective Coulomb Potential in Trans-Polyacetylene</i> — .....	Hideo Fukutome and Masaki Sasai	373
Temporal Development of the Taylor Vortices in a Rotating Fluid. V .....	Hideo Yahata	396
Similarity Structure and Scaling Property of the Period-Adding Phenomena .....	Kunihiko Kaneko	403
Statistical Mechanics of One-Dimensional Systems. III — <i>Multicomponent Gas with Kac's Potential</i> — .....	Takehiko Takano and Kazuyosi Ikeda	415
Boost Operator and Its Application to Quantum Gelfand-Levitian Equation for Heisenberg-Ising Chain with Spin One-Half .....	Kiyoshi Sogo and Miki Wadati	431
Remarks on Existence of Noise-Induced Long-Time Tail .....	Yoshiyasu Hamada and Kazuo Muto	451
Higher Order Calculations for $d$ -Dimensional Lattice with $d'$ -Dimensional Defect .....	Ryuzo Abe, Kazuhisa Yamamoto and Kazuo Ideura	464
The Densities of Charged Particles in Very Dense Interstellar Clouds .....	Toyoharu Umebayashi	480
On the Kramer-Neugebauer Spinning Masses Solutions .....	Masatoshi Yamazaki	503
Equivalent Local Potentials and Perey Factors for Various Kinds of Relative Wave Functions of RGM. I — <i>Formulation</i> — .....	Hisashi Horiuchi	516
The Role of the $Y_1^*$ Resonances in the $\bar{K}$ -Nucleus Reactions at Medium Energies .....	Naoko Yamanishi, Masahiro Kimura and Yasutaro Takahashi	535
Anharmonic Effects and Pre-Critical Phenomena in Pion Condensation .....	M. C. Ruivo, C. A. Sousa and L. P. Brito	542
Flavor Nuclei and One-Boson-Exchange Potentials .....	Hiroharu Bandō and Sinobu Nagata	557
Mass Number Dependence of Large Transverse Momentum Production and Massive Lepton Pair Production — <i>Effects of Multi-Quark Clusters on High Energy Reactions off Nuclear Targets</i> — .....	Schin Date and Atsushi Nakamura	565
Hadron-Quark Phase Transition and Statistical Quark Bag Model .....	Shigenori Kagiyama, Shigeru Hirooka, Hiroyuki Kikukawa and Junko Kikukawa	579
Damping State Method and Kaonic Bound States .....	Masaru Atarashi	589
Double Beta Decay .....	Masaru Doi, Tsuneyuki Kotani, Hiroyuki Nishiura and Eiichi Takasugi	602
The Electrodynamics with Magnetic Monopoles. II — <i>Canonical Formalism</i> — .....	Kohji Hirata	636
Analytic Regularization and Supersymmetric Ward-Takahashi Identities .....	Satish Kumar and Yasunori Fujii	653
Remarks on a Stochastic Quantization of Scalar Fields .....	John R. Klauder and Hiroshi Ezawa	664

## Progress Letters :

On Inhomogeneous Patterns in Non-Equilibrium Superconductor — $\mu^*$ Model with Boundary Condition in One Dimension — .....	Hidetoshi Konno	674
On a Growing Mode of the Boussinesq Equation .....	Nobuo Yajima	678
A Canonical Coordinate System Suitable for Adiabatic Treatment of Collective Motion — An Illustrative Model — .....	Atsushi Kuriyama and Masatoshi Yamamura	681
Thermodynamics of Phase Transition Expected in H. I. Collision at High Energy .....	Akira Hasegawa and Hiromi Tanaka	685
Mass Spectrum of Dilepton Produced in Relativistic Heavy Ion Collision .....	Akira Hasegawa	689
Can Soft Gluon Effects Be Measured in Electron-Positron Annihilation? .....	Jiro Kodaira and Luca Trentadue	693

## No. 3 March

#ility of Textures in Superfluid $^3\text{He}$ -A between Coaxial Cylinders .....	Takaaki Arai and Toshio Soda	699
n Correlation Functions on Frustrated Lattices .....	Seiji Miyashita	714
rortex Stretching and Relative Diffusion in Grid Turbulence .....	Hazime Mori and Kiyofumi Takayoshi	725
stable and Stable Limit Cycle in the Oregonator Model for the Belousov-Zhabotinskii Reaction .....	Chiaki Murase and Shinji Sakanoue	742
trophoy Cascade and Relative Diffusion in Two-Dimensional Fully-Developed Turbulence .....	Hazime Mori	756
ynamics of Vortices in Bose Fluids and Classical Continuous Spin Models .....	Shozo Takeno and Shigeo Homma	773
ritical Slowing Down in Random Growing-Rate Models with General Two Level Markov Noise .....	Fumiyoshi Sasagawa	790
uman-Alpha Absorption Lines Caused by Superclusters .....	Yutaka D. Tanaka and Satoru Ikeuchi	801
n the Generation Mechanism of Gravitational Waves in the Vicinity of a Black Hole .....	Misao Sasaki	815
large-Scale Anisotropy of the Cosmic Background Radiation Due to Primordial Density and Gravitational-Wave Perturbations .....	Kenji Tomita and Kenji Tanabe	828
n the Creation of Particles through Their Interaction in an Expanding Universe .....	Yuhji Kuroda	842
udy of Local Inter-Nucleus Potential on the Basis of the Resonating Group Method. III — <i>Parity-Dependence and Angular-Momentum-Dependence of the Inter-Nucleus Potential</i> — .....	Kaoru Aoki and Hisashi Horiuchi	857
ocal Inter-Nucleus Potential and Pauli-Forbidden States .....	Hisashi Horiuchi	886
oupling Features in $^9\text{Be}$ , $^{13}\text{C}$ and $^{21}\text{Ne}$ Hypernuclei .....	Hiroharu Bandō, Kiyomi Ikeda and Toshio Motoba	918
ound on $K^+p$ Spin-Flip Cross Section from Variational Calculus with Three Constraints .....	I. A. Sakmar and J. H. Wojtaszek	929
uark Rearrangement Model for Nucleon-Antinucleon Annihilation at Low Energies .....	Masahiro Maruyama	937
adron Distribution and QCD Form Factor Effects in $e^+e^-$ Annihilation .....	Katsuji Iguchi	953
eneralization of the Glauber-Lachs Formula, Charged Particle Distributions and the KNO Scaling at $p\bar{p}$ Collider .....	Minoru Biyajima	966
ole of $Q^2\bar{Q}^2$ Composites in $D$ -Meson Decays .....	Kanji Fujii and Hirohumi Sawayanagi	977
cale-Dependent Analysis of Phase Structures in Two- and Four-Dimensional Fermion Models .....	Minoru Ikeda	988
nique Trajectory Method in Migdal Renormalization Group Approach and $SU(2)$ Lattice Gauge Theory .....	Masahiro Imachi, Sachiko Kawabe and Hiroshi Yoneyama	1005
canonical Quantum Theory of Gravitational Field with Higher Derivatives. III — <i>A Formulation with an Additional BRS Invariance</i> — .....	Shoichiro Kawasaki and Tadahiko Kimura	1015

## Progress Letters :

opping Diffusion in a One-Dimensional Random System .....	Akito Igarashi	1031
he s-Wave Neutron Strength Function in the 3-s Giant Resonance Region .....	Izumi Furuya and Ryuzo Nakasima	1035
vestigation of Adiabatic Approximation of Deuteron-Breakup Effect on ( $d, p$ ) Reactions .....	Yasunori Iseri, Masanobu Yahiro and Masahiro Nakano	1038
ound States for a Nucleon in the Field of a Magnetic Monopole .....	Jun Makino, Masahiro Maruyama and Osamu Miyamura	1042

## No. 4 April

An Application of CPA to Binding Energy of Many Adatoms on Metallic Surface .....	Taeko Ogawa and Takeo Matsubara	10
Quasi-Superconductivity of One Dimensional Conductor .....	Toshio Soda	10
A Simplified Theory of Melting for Lennard-Jones and Ionic Crystals Based on the Self-Consistent Einstein Model .....	Tetsuo Ishii, Shigeo Naya and Satoshi Tanaka	10
Some Results in the Description of Systems under the Influence of Dichotomous Noise .....	J. M. Sancho and M. San Miguel	10
One-Dimensional Toda Molecule. I — <i>General Solution</i> — .....	Ruth Farwell and Masatsugu Minami	10
Gravitational Instabilities in a Dust-Gas Layer and Formation of Planetesimals in the Solar Nebula .....	Minoru Sekiya	11
Two Kinds of Axially Symmetric Equilibrium Sequences of Self-Gravitating and Rotating Incompressible Fluid — <i>Two-Ring Sequence and Core Ring Sequence</i> — .....	Yoshiharu Eriguchi and Izumi Hachisu	11
A Realistic Calculation of the Cooling Rate of Neutron Stars with the Charged Pion Condensate .....	Toshitaka Tatsumi	11
A Class of Simple Hamiltonians with Degenerate Ground State. I .....	Gyo Takeda and Haruo Ui	11
Study of Local Inter-Nucleus Potential on the Basis of the Resonating Group Method. IV — <i>Comparison of Various Approaches to Calculate Inter-Nucleus Potential and Study of the Origins of Deep and Shallow Potentials</i> — .....	Kaoru Aoki and Hisashi Horiuchi	11
Divergence Disease of the Pion-Baryon Interaction in Quark-Based Models .....	Y. Nogami and Akira Suzuki	11
The Production of Prompt Cosmic Ray Muons and Neutrinos .....	Hiroshi Inazawa and Keizo Kobayakawa	11
Phase Structure of the $SU(3)$ Gauge-Higgs System. I .....	Masayoshi Kikugawa, Toshinobu Maehara, Toshiyuki Minazuki, Juichi Saito and Hidekazu Tanaka	12
Quasi-Simple Preon Models .....	Masakuni Ida and Kazuhisa Kitakaze	12
Gauge-Independent Calculation of $S$ -Matrix Elements in Quantum Electrodynamics .....	Yujiro Kakudo, Yukio Taguchi, Azuma Tanaka and Kunio Yamamoto	12
Linear Approximation for the Massless Lorentz Gauge Field .....	Shikao Miyamoto, Tadao Nakano, Teruya Ohtani and Yoshinobu Tamura	12
Pathological Dynamical System with Constraints .....	Reiji Sugano and Toshiei Kimura	12
On the Choice of Gauge Conditions for Systems with Secondary First Class Constraints .....	Reiji Sugano and Toshiei Kimura	12
A Five Dimensional Unification of the Poincaré Gauge and Electromagnetic Fields .....	Toshiharu Kawai	12

## Progress Letters :

Commensurate-Incommensurate Transition in a Two Dimensional Classical Sine-Gordon System .....	Hikaru Yamamoto	13
On the Spin-Spin Correlation Function in the Ising Square Lattice .....	Keiji Yamada	13
The Equivalence of the Hubbard-Stratonovich and the Takano-Langer-Gaudin Transformations for a One-Dimensional Peierls System .....	L. G. Caron and C. Bourbonnais	13
Nonuniversal Accumulation of Bifurcations Leading to Homoclinic Tangency ..	Hiroaki Daido	13
Quark ALS Structure with Condensed $\pi^0$ Field in Chiral Bag Model .....	Ryozo Tamagaki, Toshitaka Tatsumi and Ikuo Watanabe	13
$\Sigma$ Hypernuclear States in Finite Nuclei with the Nijmegen OBE Interaction .....	Yasuo Yamamoto and Hiroharu Bandō	13
Effects of $I=3/2$ Higher Resonances in Weak One-Pion Production .....	Yasuo Ezawa, Tadashi Yano, Masayoshi Kikugawa and Masao Shiohara	13

Exact Solutions to Mean-Field Equations in Lattice Gauge Theories .....	Shijong Ryang and Takesi Saito	1320
<b>No. 5 May</b>		
Hydrodynamical Formalism of Quantum Mechanics and Aharonov-Bohm Effect .....	Takehiko Takabayasi	1323
e High Temperature Series for the Single-Band Hubbard Model in the Strong Correlation Limit. I .....	Kenn Kubo and Masahito Tada	1345
mments on Surface-Induced Magnetism of Liquid $^3\text{He}$ in Restricted Geometries .....	Hisao Jichu and Yoshihiro Kuroda	1358
tron Exchange Amplitude for the Excitation of Hydrogen-Like Ions by Electron Impact .....	Hiroshi Kotegawa, Wen-Jia Chen and Hajime Narumi	1369
atic Behavior of Magnetization in Superfluid $^3\text{He}$ Driven by External Periodic Field .....	Yoshihiro Yamaguchi	1377
arse-Grained Quantities and Local Environment Effects in Disordered Systems .....	Masaki Goda	1396
haotic Response of a Self-Interacting Pseudo-Spin Model .....	Masayoshi Inoue and Hitoshi Koga	1403
eneralization of Baker's Transformation — <i>Chaos and Stochastic Process on a Smale's Horse-Shoe</i> — .....	Yoji Aizawa and Chikara Murakami	1416
ransition from Torus to Chaos Accompanied by Frequency Lockings with Symmetry Breaking — <i>In Connection with the Coupled-Logistic Map</i> — .....	Kunihiko Kaneko	1427
air Equilibrium in a Relativistic Plasma with Magnetic Fields .....	Masaaki Kusunose and Fumio Takahara	1443
large $P_T$ Spectrum as a Possible Signal for Quark Matter Formation .....	Shigenori Kagiyama and Toshikazu Hirose	1457
Deformable Bag Model of Hadrons. I .....	Haruo Ui and Koichi Saito	1467
iggs Boson Production in High Energy Lepton-Nucleon Scattering .....	Zenrō Hioki, Shoichi Midorikawa and Hiroyuki Nishiura	1484
relativistic Quarkonium Model Based on Instantaneous Ladder BS Equation. II — <i>Mass Levels of Charmonium and Bottomonium</i> — .....	Masanobu Hirano, Kenzō Iwata, Kiyoshi Katō, Toshiyuki Murota and Denju Tsuruda	1498
roton Lifetime in an $SO(10)$ Grand Unified Theory .....	Takayuki Matsuki and Noboru Yamamoto	1505
estoration of the Local Gauge Symmetry and Color Confinement in Non-Abelian Gauge Theories. II .....	Hiroyuki Hata	1524
onfinement Criteria and Compact $(\text{QED})_{2+1}$ .....	Tuneo Suzuki and Kayo Shimada	1537
xially Symmetric Gauge Fields of Magnetic Monopoles .....	R. P. Mondaini and N. O. Santos	1548
ual Preon Models. I — <i>The <math>SU(7) \otimes SU(7)</math> Model</i> — .....	Masakuni Ida	1554
ual Preon Models. II — <i>The <math>SO(10) \otimes SO(10)</math> Model</i> — .....	Masakuni Ida	1569
stochastic Quantization of Non-Abelian Gauge Field — <i>Unitarity Problem and Faddeev-Popov Ghost Effects</i> — .....	Mikio Namiki, Ichiro Ohba, Keisuke Okano and Yoshiya Yamanaka	1580
stochastic Quantization Method of Fermion Fields .....	Tomoki Fukai, Hiromichi Nakazato, Ichiro Ohba, Keisuke Okano and Yoshiya Yamanaka	1600
definite-Metric Quantum Field Theory of General Relativity. XVI — <i>Extension of Tensor-like Commutation Relations</i> — .....	Noboru Nakanishi	1617
n the Interaction of Quantum Spinor Fields with Extended Objects .....	H. Matsumoto, G. Semenoff and H. Umezawa	1631
he Rotational Mode of Asymmetric Object in Quantum Field Theory .....	N. J. Papastamatiou, H. Matsumoto and H. Umezawa	1647

**Progress Letters :**

- Electrical Conductivity of a Quasi-One-Dimensional Superconductor ..... Kiyomi Okamoto  
 Inclusive Reaction of Nuclei Induced by Pions at Intermediate Energies ..... Jun-ichi Suzumura  
 A Separable Potential and Off-Shell Scattering Amplitude for an  $\alpha$ - $A$  Interaction ..... Shinsho Oryu and R. Kircher

**No. 6 June**

- Anderson Localization and Energy Gap in Two-Dimensional Superconductors ..... Haruo Takagi and Yoshihiro Kuroda  
 Cluster Expansion for the Thermodynamic Potential of Simple Metals ..... Kuniyoshi Ebina  
 Effects of the Proton-Neutron Hole Interaction to the Form Factor in  $(d, t)$  Reactions on  $N=50$  Target Nuclei ..... Ryo-ichi Namai  
 Molecular Orbital Model Study of the  $^9_A$ Be,  $^{10}_A$ Be,  $^{11}_A$ Be and  $^{12}_A$ Be Hypernuclei ..... Kōichi Miyahara, Kiyomi Ikeda and Hiroharu Bandō  
 Structure of the  $^{10}_A$ Be Hypernucleus ..... Hiroharu Bandō  
 $O(4)$  Symmetry in Inclusive Lepton-Hadron Scatterings ..... Susumu Koretune  
 The Effective Potential Method for Two-Dimensional  $SU(2) \times SU(2)$  Lattice Sigma Model with the Fundamental-Adjoint Action ..... Kazuo Nakura  
 Stochastic Quantization Method in Operator Formalism ..... Mikio Namiki and Yoshiya Yamanaka

**Progress Letters :**

- Fermi Liquid Theory of Dilute Submonolayer  $^3$ He on Thin  $^4$ He II Film — *Dimer Bound State and Cooper Pairs* ..... Kazumasa Miyake  
 Exciton Solitons in One-Dimensional Molecular Crystals ..... Shozo Takeno  
 Period-Doubling Cascade in the Rayleigh-Bénard Convection ..... Hideo Yahata  
 Doubling of Torus ..... Kunihiko Kaneko  
 An Equation for the Quasi-Particle RPA Based on the  $SO(2N+1)$  Lie Algebra of the Fermion Operators ..... Seiya Nishiyama  
 Large  $N$  Limit of Composite Quarks and Leptons ..... Shoichiro Otsuki and Fumihiro Toyoda  
 $1/N_{\text{subcolour}}$  and Quark-Lepton Mass Hierarchies ..... Ken-iti Matumoto  
 Phase Diagram of the  $SU(2)$  Lattice Gauge Theory with a Mixed Action ..... Kazuo Ghoroku, Yasuo Myojo and Hiroyuki Nagai  
 Color Confinement and Asymptotic Completeness ..... Tsuneo Suzuki  
 Fractional Charges at Finite Temperature ..... Shiochi Midorikawa  
 Geometrical Description of BRS and Anti-BRS Transformations for the Gravitational Fields ..... Hiroyuki Kikugawa and Junko Kikugawa  
 Where Has the Four Dimensionality Come from? ..... Hirohisa Ishikawa
- Author Index to Volume 69 .....  
 Subject Index to Volume 69 .....  
 Contents to Volume 69 .....